IT STARTED WITH A SEED

I think the greatest wonder of Nature is the way a seed grows into something often bearing no resemblance to the seed yet massively greater in size. The acorn and the oak tree spring to mind, as does the tiny carrot seed only a little bigger than a grain of sand, which grows into a massive carrot – up to 6 pounds in the case of some of my carrots on the allotment. But how does that tiny carrot seed grab material from here and there and everywhere to build up its body weight so that in two years' time it can flower and produce many thousands of seeds to repeat the process? Well, the DNA of the carrot seed tells the seed to put forth a tiny shoot and tiny roots when triggered by an initial absorption of water. Much of the resultant giant carrot will be water, that essential building component of all life forms.

The tiny shoot then receives energy from sunlight to form chlorophyll. There is a simultaneous input into the seed (with its initial shoot) of energy from the sun, hydrogen and oxygen from water and carbon dioxide from the air. The initial chlorophyll enables the splitting of water into hydrogen and oxygen, which then react chemically with the carbon in carbon dioxide to form a variety of hydrocarbon compounds which are then used to produce more chlorophyll and to enable the production of leaves and more roots. Using its roots, in moist earth, the carrot absorbs a great many other nutrients from the soil and the plant is then a mini chemical factory absorbing the nutrients it needs and converting them into chemical compounds.

It is the DNA which determines the taste of the resultant vegetable as a carrot. A cabbage seed is of a similar size to the carrot seed and, if grown in exactly the same place as the carrot seed, using exactly the same nutrients, defiantly produces a vegetable which does not taste at all like a carrot. That is counter-intuitive. If one bakes two cakes with exactly the same ingredients one ends up with two cakes which taste more or less the same. Yet the DNA of the carrot and the cabbage command the roots to absorb different proportions of the nutrients and then to cause different chemical reactions to produce different chemical compounds giving the carrot and the cabbage their completely different tastes.

A word about tomatoes, which start out with similarly-sized seeds to the carrot and the cabbage. There is a world of difference between my tomatoes and the typical supermarket winter tomatoes which are nothing but red bags of water. I am completely convinced that the difference lies in the amount and types of nutrients which the tomatoes have absorbed. My evidence is as follows. People say there is nothing like the taste of a tomato eaten fresh straight from the greenhouse, as though it is the freshness which is responsible for the delightful taste. Nothing could be further from the truth. I regularly pick tomatoes before going away at all stages of green under-ripeness and eat them as they ripen to a bright red – some 5 weeks after picking in some cases. They all taste the same; they all taste delicious. It is definitely the nutrients which give the taste, not the freshness.

So what is wrong with supermarket winter tomatoes? It is probable that they have not been grown in nutrient-rich soil. It is probable that they have been grown in water, a product of hydroponics where the roots are surrounded by water and the rest of the plant is bathed in artificial light and kept at the right temperature to ensure rapid growth. The water has to be actively aerated to ensure the roots receive adequate oxygen. Light has to be excluded from the water to prevent the growth of algae. Into the water various nutrients are added. Commercially the "Hoagland Arnon" solution is used, which consists of six macro nutrients: nitrogen, potassium, phosphorus, calcium, sulphur and magnesium, and six micro-nutrients: boron, iron, manganese, zinc, copper and molybdenum. Those are deemed to be the only nutrients needed for plant growth (plus, of course, hydrogen and oxygen from the water and carbon from carbon dioxide in the air). But there are other nutrients which are essential for plant growth which are not included in the Hoagland Arnon hydroponic mixture, such as chlorine*, nickel*, cobalt*, vanadium*, selenium*, silicon*, sodium*, fluorine*, chromium* and aluminium. And those marked (*) are also ESSENTIAL for <u>our</u> health, so if we lived by hydroponics alone we would come to a very sticky end. Coming back to the red water-bags masquerading as tomatoes, it seems to me that costs are cut in their production and many Hoagland Arnon nutrients are

not included in the hydroponic solution (or, if they are, in inadequate amounts), quite apart from the complete exclusion of the 10 essential nutrients mentioned above. It is far, far better for health reasons and for the enjoyment of taste, for vegetables and fruit to be grown in nutrient-rich soil where mycorrhizal fungi can bring to the roots all the required nutrients in the quantities and proportions required by the plants.

The leaves of the aforementioned carrots contain chlorophyll which creates magic. Using energy from the sun it achieves an apparently impossible feat – the splitting of water into its constituents hydrogen and oxygen by photosynthesis. It also splits carbon dioxide from the air into carbon and oxygen. There are a few types of chlorophyll, the most common type consisting of a molecule having one magnesium atom, 55 carbon atoms, 72 hydrogen atoms, 5 oxygen atoms and 4 nitrogen atoms. Now, wasn't Mother Nature clever to have put that lot together! Some of the hydrogen released from water by photosynthesis moves to the roots of the carrot where it bounds free and combines with chemical compounds in the soil to release nutrients to be taken up by the roots. Other parts of the hydrogen combine with carbon and oxygen to form hydrocarbon compounds as building blocks for the plant. And here is the most magical bit – some of the freed oxygen from the water and the carbon dioxide is expelled from the leaves of the plant as free oxygen for us to breathe. So, just as we breathe in oxygen and breathe out carbon dioxide, so the plant breathes in carbon dioxide and breathes out oxygen. A convenient arrangement! To demonstrate, put a house plant into a large plastic bag then put your head into the plastic bag, breathing in the oxygen from the plant and breathing out carbon dioxide onto the plant's leaves. (No, don't do that! The plant will not produce enough oxygen to support your life. An allotment full of plants might be necessary.) However, I hope the example has shown the complete inter-dependence of animals and plants. One cannot live without the other and we are completely dependent upon plants for the oxygen we need.

The carrot produces its seeds the second year, and I have let some carrots grow for that second year and collected many thousands of seeds for sowing over the following 7 or 8 years. I have similarly collected the seeds of beetroot, radishes, coriander, leeks, Italian parsley, French parsley and beans of several kinds. Carrots, beetroot, leeks and parsley produce their seeds the second year and the others the first year. The seeds are always viable and I always have a better germination rate from my own seeds than from purchased seeds – and I have enough free seeds for many, many years. Also, I always put aside from my crops a few potatoes, elephant garlic and shallots for planting out the following season. The crops from my own seeds are completely and truly organic, free from pesticides, fungicides, herbicides and other "homicides"!!

Good gardening,

MIKE MASON